No. 747,667. PATENTED DEC. 22, 1903.

R. W. WALKER.

TYPE WRITER.

APPLICATION FILED JULY 21, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

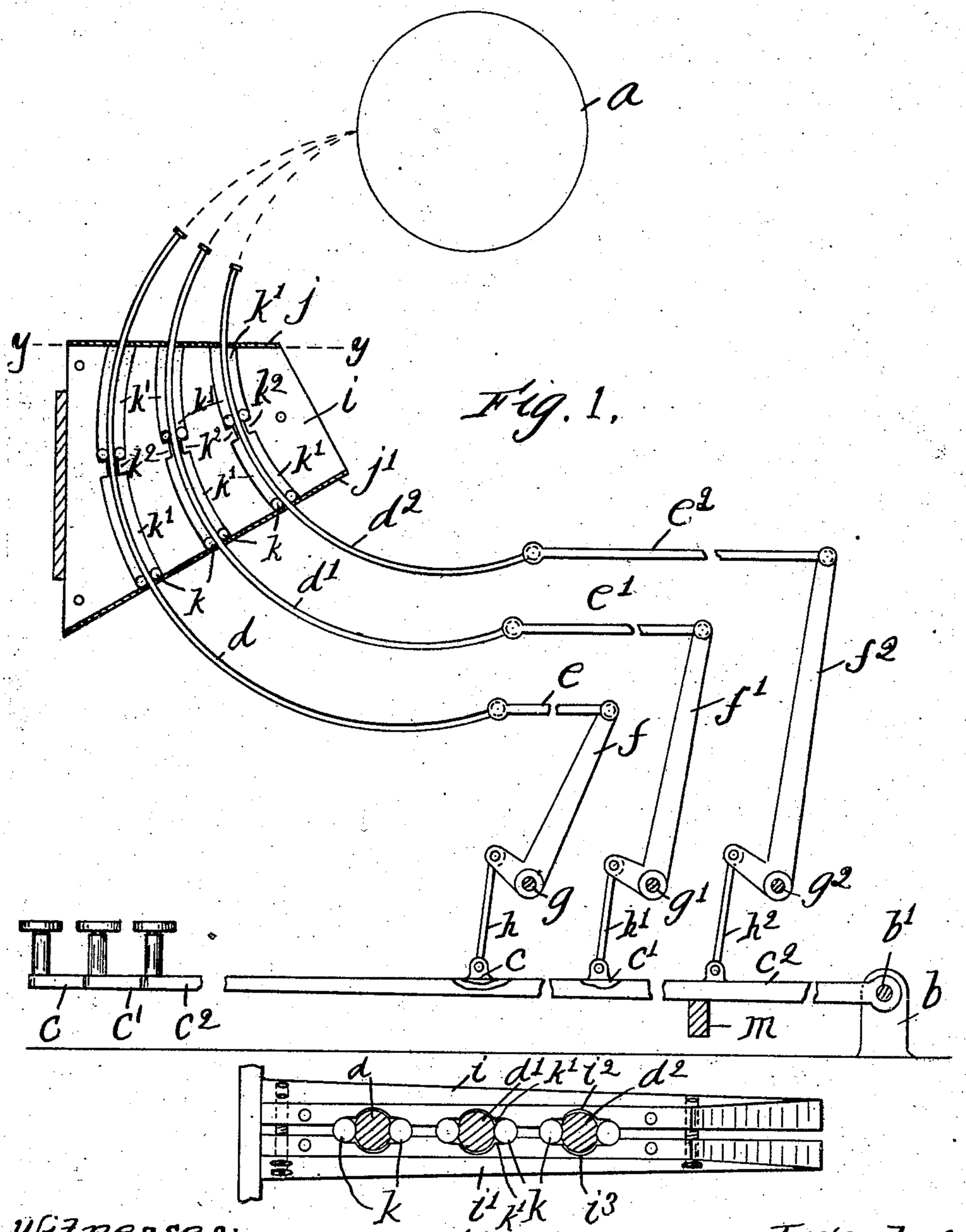

Fig. 1.

Fig. 3.

Witnesses:
H. B. Davis.
Maud M. Pyle

Inventor:
Raymond W. Walker
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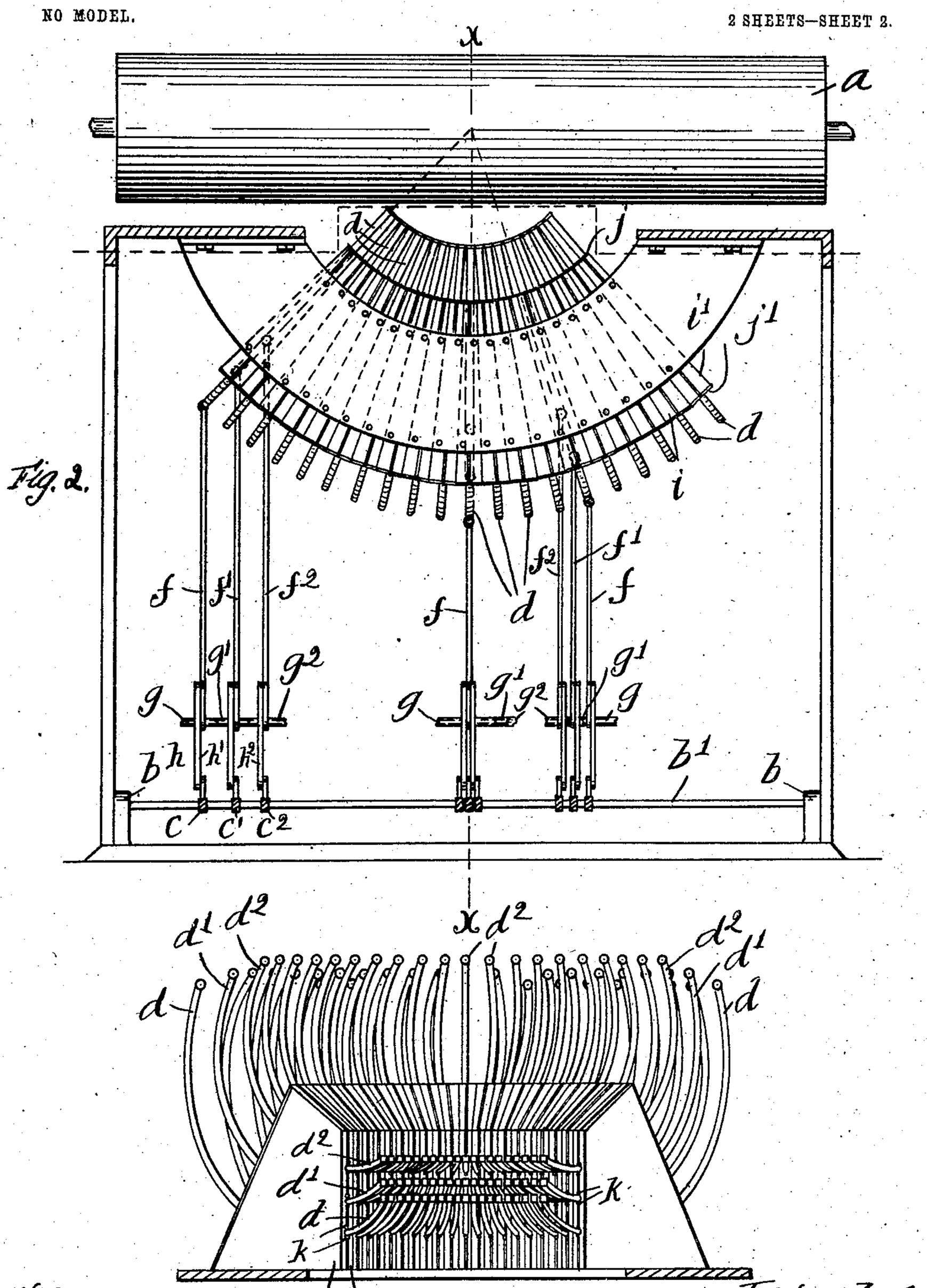

Fig. 2.

Fig. 4.

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No. 747,667. Patented December 22, 1903.

UNITED STATES PATENT OFFICE.

RAYMOND W. WALKER, OF WESTBORO, MASSACHUSETTS.

TYPE-WRITER.

SPECIFICATION forming part of Letters Patent No. 747,667, dated December 22, 1903.

Application filed July 21, 1903. Serial No. 166,423. (No model.)

To all whom it may concern:

Be it known that I, RAYMOND W. WALKER, of Westboro, county of Worcester, State of Massachusetts, have invented an Improvement in Type-Writers, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

The object of my invention is to produce a type-writing machine of the class known as "visible" writers, in which the type-carrying bars move longitudinally in the arc of a circle and in which suitable guiding means or bearings for said bars are provided, so that the action of the bars will be easy and the liability of their getting out of alinement will be reduced to a minimum, and, further, so that a type-writer of the above character may be produced which may have nearly twice as many type-bars as may be employed practically in type-writers having swinging or straight longitudinally-movable bars.

In the drawings, Figure 1 is a central vertical section through the line $x\,x$ of Fig. 2. Fig. 2 is a front elevation. Fig. 3 is an enlarged section on the line $y\,y$ of Fig. 1. Fig. 4 is a plan view of the type-bars and guiding means therefor.

In illustrating my invention I have shown only those parts of a type-writer which directly coöperate therewith.

The roll of a type-writer is indicated at a. A pivot-rod b is supported in lugs b', integral with the frame of the machine, and the key-levers c c' c^2, &c., are pivoted at their rear ends to said rod. A series of circularly-curved type-bars d d' d^2, &c., are provided, said bars being arranged in three rows (see Fig. 4) and movable in the arc of a circle, one bar in each row being movable longitudinally in approximately the same plane as one of the bars in each of the other rows. The bars are so arranged and movable that their upper ends will all engage squarely the same point on the roll, as indicated in Figs. 1 and 3.

A single type preferably is carried on the upper end of each bar, although a head bearing two characters obviously may be provided when a "shift" is employed. When the bars are in their retracted position, the type at their ends will be arranged as closely together as practicable. (See Fig. 4.) Said bars are respectively connected by links e e' e^2, &c., to bell-crank levers f f' f^2, the joints between said links and the bars and levers being ball or universal joints of any suitable character. Said levers f f' f^2 are pivoted on horizontal rods g g' g^2, and their opposite ends from the links are connected to the key-levers c c' c^2, &c., by links h h' h^2, &c.

A series of pairs of guiding-plates i i', &c., are provided for each set of three bars which are in the same plane, said plates having curved grooves or guideways i^2 i^3 formed in their adjacent faces, the curve of said grooves corresponding, respectively, to the curve of the particular bars which are to be located therein, so that the bars will slide freely therein when said plates are held together, as illustrated in Figs. 1, 3, and 4.

Bearing-balls k are arranged in ball-chambers k', formed in said plates adjacent the front and rear sides of each bar, said chambers leading from said grooves i^2 i^3 and each chamber being separated midway thereof at each side of the bars by separating-shoulders k^2 or similar devices. A single ball k is located in each chamber at each side of each separator k^2, said balls being free to roll the entire length thereof. The upper and lower ends of said plates i i' are covered with plates j j', the lower plates j' preventing the balls from dropping out of the lower portions of said chambers k' and the upper plates j preventing the balls in the upper portions from rolling out of the upper ends thereof when the bars are forced upward. The balls k normally rest on said separators k^2 and plates j', respectively; but when a bar is forced upward against the platen the balls will be rolled upward, so that the friction between the plates and bars will be minimized.

The guiding-plates i i', &c., are made slightly tapering from their lower ends upward, one pair of said plates being preferably provided for each set of three bars which are located in the same plane and said plates being secured together as compactly as possible. It will be observed that while the middle set of bars is in a vertical plane the planes of the other sets are oblique, the

degree of obliquity of each plane or set of bars varying according to the distance between it and the middle set.

As the key-lever and bell-crank-levers all operate in vertical planes, it is necessary, therefore, for the connecting-links of all the obliquely-disposed bars to move to a slightly-oblique position from the vertical, as the operating-levers are moved to actuate the bars to which they are respectively connected.

It will be apparent that when a key is depressed the bar connected thereto will be moved against the platen, the usual spring-actuated bar *m* being employed to return the keys to their initial position.

While I have illustrated the use of three rows of type-bars, it will be apparent that four rows may be provided when it is desired to produce a machine that will print a large number of characters, while only two rows of bars will be necessary when a shift is employed.

Various other changes may be made without departing from the spirit and scope of my invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A type-writer comprising a series of circularly-curved bars having type at their ends, a series of guides therefor, and means for moving said bars longitudinally between said guides in the arc of a circle, substantially as described.

2. A type-writer comprising a series of circularly-curved bars having type at their ends, a series of pairs of guiding-plates, each pair arranged at opposite sides of one of said bars, and means for holding them together, and means for moving said bars longitudinally between said guides in the arc of a circle, substantially as described.

3. A type-writer comprising a series of circularly-curved bars having type at their ends, guiding devices therefor between which said bars are movable longitudinally in the arc of a circle, said guiding devices having elongated ball-containing chambers adjacent said bars to provide bearings therefor, and operating means for said bars, substantially as described.

4. A type-writer comprising a series of circularly-curved bars having type at their ends, a series of pairs of guiding-plates, each pair arranged at opposite sides of one of said bars, said plates having elongated ball-containing chambers adjacent said bars to provide bearings therefor, and means for moving said bars longitudinally in the arc of a circle, between said balls, substantially as described.

5. A type-writer comprising a series of circularly-curved bars having type at their ends, guiding devices therefor between which said bars are movable longitudinally in the arc of a circle, said guiding devices having elongated ball-containing chambers adjacent said bars, ball-separating means midway of said chambers, a ball being provided at each side of said separating means, and operating means for said bars, substantially as described.

6. A type-writer comprising a series of circularly-curved bars having type at their upper ends, means for guiding said bars to move longitudinally in the arc of a circle, a series of key-actuated levers movable in parallel planes, a series of links, and universal joints connecting the lower ends of said bars and levers, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

RAYMOND W. WALKER.

Witnesses:
LOUIS H. HARRIMAN,
MAUD M. PIPER.